



“Biogas Production from Organic Residues”



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About Us

Biogas Maxx is a consultant company that combines the skills and experience on project development of a global network of experts in bio-energy (US, Spain, Germany and Mexico). Our goal is to design, develop and operate the best bioenergy solutions in the world with the best value for your company.



What is biogas?

Is a mixture of gases produced by microorganisms as a result of organic matter decomposition (breakdown) in the absence of oxygen.

Compound	Formula	%
Methane	CH ₄	50 – 70
Carbon dioxide	CO ₂	25 – 50
Nitrogen	N ₂	0 – 10
Hydrogen	H ₂	0 – 1
Hydrogen sulfide	H ₂ S	0 – 3
Oxygen	O ₂	0 – 0
Water vapor	H ₂ O	1.5 – 3

How is biogas turned into energy?

It can be transformed into energy and/or work by means of mechanical, chemical or physical principles and technologies.

Input	Principle	Technology	Output
	Mechanical	CHP unit / Micro-turbine	Electrical and thermal energy
	Mechanical	Combustion engine	Movement
Biogas	Chemical	Fuel cells	Electrical and thermal energy
	Chemical	Boiler unit	Thermal energy
	Physical	CO ₂ scrubber	High quality fuel (Natural Gas)

Which kind of residues can be turned into energy?

About any organic residue.

- **Agricultural Residues** (Dung, Straw, Crops residues, Stems, Leaves, Grass, Pomace, Green cuts, etc.)
- **Urban Solid Waste** (Domestic residues, Burned cooking oil, Supermarket garbage, Sludge from waste water treatment plants, Organic Solid Waste, etc.)
- **Liquid Wastes** (Manure from farm animals, Process waste water, Milk production wastes, Food industry, etc.)
- **Industrial Residues** (Beverage Ind., Molasses, Bagasse, Animal Fat, Glycerine, etc.)
- **Energy Crops** (Crops silage (whole plant) i.e. Corn-silage, Soy-silage, Sugar-beet, etc.)

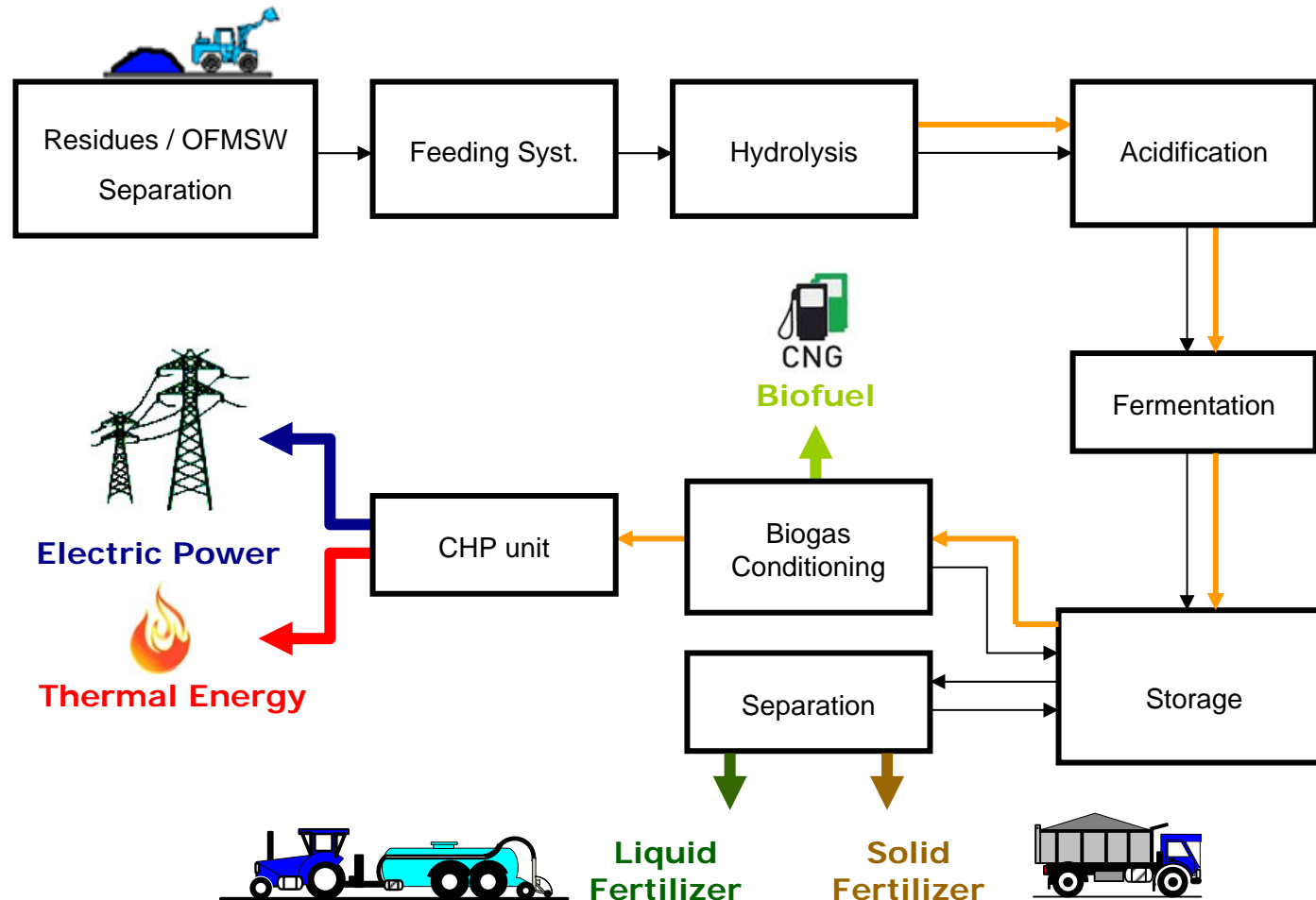
Industrial Biogas Technologies

To choose the right technology a substrate characterization is required. It depends on its properties, structure, volume, etc. As well on the customer needs and local market conditions (for the sell or usage of all by-products)

- Wet Anaerobic Digestion
 - One stage processes
 - Multi-stage processes
 - Liquid residues (i.e. TVS < 5%)
- Dry Anaerobic Digestion
 - One stage processes
 - Multi-stage processes
 - Dump yards

I.e.: Wet Anaerobic Digestion Multi-stages

- % Total Volatile Solids (TVS) 5% to 15%, Complex carbohydrate structures (i.e. peels, green cuts, seeds, pomace, fibrous materials, etc.)



Project Feasibility

Strongly dependent upon the [sell or usage](#) of process by-prod.:

- [Electric power](#)
 - Offset of public electricity (self consumption)
 - Electricity exports to the grid
- [Thermal energy](#)
 - Offset of Propane (LPG) or Natural Gas (NG)
 - Use (Refrigeration, Drying, Heating, Steam, etc.)
 - Sale to third parties (Farms, Hospitals, Factories, etc.)
- [Organic Fertilizer](#)
 - Offset of chemical fertilizers produced from oil
 - Sale to farmers or hobby gardening users
 - Sale of Pellets or briquetts
 - Compost burning for thermal energy recovery
 - CO₂ for green-houses

Project Feasibility

Strongly dependent upon the [sell or usage](#) of process by-prod.:

- Bio-fuel
 - Bio-methane (BIO-CNG) 99% CH₄
 - Vehicle fuel
- Gas Grid Injection
 - Natural gas grid injection
 - Stoves
 - Electric Power Facilities burning NG

Project Feasibility

Strongly dependent on plant size, funding conditions and type of feedstock

- Cost per kW
 - Between 3,000 a 4,500 EUR/kW (Most common range)
 - Up to 19,000 EUR/kW (Upon process complexity & Tech.)
- Pay back period & IRR
 - Pay-back between 6 & 8 years
 - IRR between 12% to 20% or bigger
- Funding conditions
 - Subsidies or Grants
 - Tax exemptions
 - Interest rate
 - Bank loan & payback period
 - Own equity
 - Tax rate, etc.

Conclusions

Through biogas technology most organic residues (liquid and Solid ones) could be treated and transformed into electrical power, thermal power, biofuels, organic fertilizers or even used for refrigeration.

- The biogas technology is a mature technology with more than 50 years of existence and over 20 year of it industrial application (i.e. Germany).
- It is the most efficient conversion technology over bioethanol, biodiesel, BTL, etc.
- In Europe exist more than 8,000 biogas facilities into operation nowadays and the number is in rise.

Conclusions

- Renewable Energies constitute a **strategic investment** with good margins, sustainable for the environment & new business opportunities.
- The cost per kW goes from **3,000** to **4,500** Euros
- Economic feasibility depends strongly on the **sale or usage** of the by-products of anaerobic digestion (AD). (i.e. electricity, heat or biofuels & organic fertilizer)
- AD is a **superior technology** over composting, incineration or landfills. All these technologies have a negative energy balance (use more energy than the one produced).
- Biogas Maxx based on a **large experience** offers you consultancy to place your business at the forefront of sustainable energy production. Contact us!



...Thank's for your attention!



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